

SEQUENCE LISTING

<110> University Gent
 <120> Ostertagia vaccine
 <130> 2002-015
 <150> US 10/243,319
 <151> 2002-09-13
 <160> 27
 <170> PatentIn version 3.2
 <210> 1
 <211> 828
 <212> DNA
 <213> Ostertagia ostertagi

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 <222> (11)..(721)

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ctg gtg aca tca aat acc gaa gca ggt ttt tgc tgc cca gca gat cta 97
 Leu Val Thr Ser Asn Thr Glu Ala Gly Phe Cys Cys Pro Ala Asp Leu
 15 20 25

aac caa act gat gag gca aga maa atc ttc ctc gat ttt cac aat caa 145
 Asn Gln Thr Asp Glu Ala Arg Xaa Ile Phe Leu Asp Phe His Asn Gln
 30 35 40 45

gtt cgc cgt gat ata gca ggt gca agc ccg ttg ctc aac ctc acc gga 193
 Val Arg Arg Asp Ile Ala Gly Ala Ser Pro Leu Leu Asn Leu Thr Gly
 50 55 60

gct gtt car atg cga aat gtt ctc ggt cca gct aag aac atg tac aga 241
 Ala Val Gln Met Arg Asn Val Leu Gly Pro Ala Lys Asn Met Tyr Arg
 65 70 75

atg gac tgg gac tgc aat ctg gaa gca aaa gca aag gca atg att tgg 289
 Met Asp Trp Asp Cys Asn Leu Glu Ala Lys Ala Lys Ala Met Ile Trp
 80 85 90

cca tgc act acg cct ctg cca ata gac acg agt att cca caa aat ctc 337
 Pro Cys Thr Thr Pro Leu Pro Ile Asp Thr Ser Ile Pro Gln Asn Leu
 95 100 105

gct car tgg cta ctt ttc caa aac agt cag gaa amt gaa gtg ttg acg 385
 Ala Gln Trp Leu Leu Phe Gln Asn Ser Gln Glu Xaa Glu Val Leu Thr
 110 115 120 125

caa acg ccc tgg tct tgg gta acc gca tca cta cga aat ctt caa cct	433		
Gln Thr Pro Trp Ser Trp Val Thr Ala Ser Leu Arg Asn Leu Gln Pro			
130	135	140	
gat aca gaa gct aac att tat aac tgg caa att aga cca cta tcc aac	481		
Asp Thr Glu Ala Asn Ile Tyr Asn Trp Gln Ile Arg Pro Leu Ser Asn			
145	150	155	
att gcg aac tgg caa aac cta aaa gtt gga tgt gct cac aaa gtg tgc	529		
Ile Ala Asn Trp Gln Asn Leu Lys Val Gly Cys Ala His Lys Val Cys			
160	165	170	
aaa ttc ccc acc ggg aca aat atg gtt gtg tct tgc gct tat ggc ggc	577		
Lys Phe Pro Thr Gly Thr Asn Met Val Val Ser Cys Ala Tyr Gly Gly			
175	180	185	
gaa gta ctc caa gat aac gaa gtt gta tgg gac aag gga cca act tgc	625		
Glu Val Leu Gln Asp Asn Glu Val Val Trp Asp Lys Gly Pro Thr Cys			
190	195	200	205
atg tgc aat gct tat ccc aac tcg ttc tgc tgc aac aat ctg tgt gac	673		
Met Cys Asn Ala Tyr Pro Asn Ser Phe Cys Cys Asn Asn Leu Cys Asp			
210	215	220	
aca ata gct gct gcg aca ctt cgc aag cag cct tgt aaa tcg act tga	721		
Thr Ile Ala Ala Thr Leu Arg Lys Gln Pro Cys Lys Ser Thr			
225	230	235	
agcgaaaagg cgttggtgat gtcccgaga gaacggaagt gatcacatca cagtatccca	781		
taatgtcggtt catcataata aacgcacttc tctgaaaaaaaa aaaaaaaaa	828		

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 <213> *Ostertagia ostertagi*

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 <222> (37)..(37)
 <223> The 'Xaa' at location 37 stands for Lys, or Gln.

<220>
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 <222> (121)..(121)
 <223> The 'Xaa' at location 121 stands for Asn, or Thr.

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Met Gln Ala Leu Ile Gly Ile Ala Ala Leu Tyr Leu Val Val Thr			
1	5	10	15

Ser Asn Thr Glu Ala Gly Phe Cys Cys Pro Ala Asp Leu Asn Gln Thr		
20	25	30

Asp Glu Ala Arg Xaa Ile Phe Leu Asp Phe His Asn Gln Val Arg Arg		
35	40	45

Asp Ile Ala Gly Ala Ser Pro Leu Leu Asn Leu Thr Gly Ala Val Gln
 50 55 60

Met Arg Asn Val Leu Gly Pro Ala Lys Asn Met Tyr Arg Met Asp Trp
 65 70 75 80

Asp Cys Asn Leu Glu Ala Lys Ala Lys Ala Met Ile Trp Pro Cys Thr
 85 90 95

Thr Pro Leu Pro Ile Asp Thr Ser Ile Pro Gln Asn Leu Ala Gln Trp
 100 105 110

Leu Leu Phe Gln Asn Ser Gln Glu Xaa Glu Val Leu Thr Gln Thr Pro
 115 120 125

Trp Ser Trp Val Thr Ala Ser Leu Arg Asn Leu Gln Pro Asp Thr Glu
 130 135 140

Ala Asn Ile Tyr Asn Trp Gln Ile Arg Pro Leu Ser Asn Ile Ala Asn
 145 150 155 160

Trp Gln Asn Leu Lys Val Gly Cys Ala His Lys Val Cys Lys Phe Pro
 165 170 175

Thr Gly Thr Asn Met Val Val Ser Cys Ala Tyr Gly Gly Glu Val Leu
 180 185 190

Gln Asp Asn Glu Val Val Trp Asp Lys Gly Pro Thr Cys Met Cys Asn
 195 200 205

Ala Tyr Pro Asn Ser Phe Cys Cys Asn Asn Leu Cys Asp Thr Ile Ala
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Ala Ala Thr Leu Arg Lys Gln Pro Cys Lys Ser Thr
 225 230 235

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gc ggc cgc gnc gac cnt gtg atc agc atc atg gct ctg tgg ccc gtg      47
  Gly Arg Xaa Asp Xaa Val Ile Ser Ile Met Ala Leu Trp Pro Val
  1           5           10          15

gac cgt ttc gag cgc atg ctg gaa gag ccg ttc ang cgt gtg gat cgt      95
  Asp Arg Phe Glu Arg Met Leu Glu Glu Pro Phe Xaa Arg Val Asp Arg
  20          25          30

ttc tgc ccg atg aga gat gcg gac tgg atg agc cgt cag att atg ccc      143
  Phe Cys Pro Met Arg Asp Ala Asp Trp Met Ser Arg Gln Ile Met Pro
  35          40          45

tac tgg aga gat gcc gat cac tct gtg ctt cat gtg gga aat caa aca      191
  Tyr Trp Arg Asp Ala Asp His Ser Val Leu His Val Gly Asn Gln Thr
  50          55          60

aag gat gtc gtg aat gac gag aag aaa ttc gca gnc gct ttg gat gtg      239
  Lys Asp Val Val Asn Asp Glu Lys Lys Phe Ala Xaa Ala Leu Asp Val
  65          70          75

nca cac ttn agg cca gaa gag ttg aag gta caa ttg gaa gtg acg      284
  Xaa His Xaa Arg Pro Glu Glu Leu Lys Val Gln Leu Glu Val Thr
  80          85          90

tgaccttaca atcgaaggac at

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<210> 4
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 <213> Ostertagia ostertagi

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 <223> The 'Xaa' at location 3 stands for Asp, Gly, Ala, or Val.

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 <222> (5)..(5)
 <223> The 'Xaa' at location 5 stands for His, Arg, Pro, or Leu.

<220>
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 <222> (27)..(27)
 <223> The 'Xaa' at location 27 stands for Lys, Arg, Thr, or Met.

<220>
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 <222> (75)..(75)
 <223> The 'Xaa' at location 75 stands for Asp, Gly, Ala, or Val.

<220>
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 <222> (80)..(80)
 <223> The 'Xaa' at location 80 stands for Thr, Ala, Pro, or Ser.

<220>
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 <222> (82)..(82)
 <223> The 'Xaa' at location 82 stands for Leu, or Phe.

<400> 4

Gly Arg Xaa Asp Xaa Val Ile Ser Ile Met Ala Leu Trp Pro Val Asp
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Arg Phe Glu Arg Met Leu Glu Glu Pro Phe Xaa Arg Val Asp Arg Phe
 20 25 30

Cys Pro Met Arg Asp Ala Asp Trp Met Ser Arg Gln Ile Met Pro Tyr
 35 40 45

Trp Arg Asp Ala Asp His Ser Val Leu His Val Gly Asn Gln Thr Lys
 50 55 60

Asp Val Val Asn Asp Glu Lys Lys Phe Ala Xaa Ala Leu Asp Val Xaa
 65 70 75 80

His Xaa Arg Pro Glu Glu Leu Lys Val Gln Leu Glu Val Thr
 85 90

<210> 5
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 <213> *Ostertagia ostertagi*

<220>
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 Ala Phe Ile Gly Lys Pro Ala Pro Asp Phe Ala Thr Lys Ala Val Tyr
 1 5 10 15

aat ggc gac ttc atc gac gtg aaa ctg tct gac tac aag ggc aag tac 97
 Asn Gly Asp Phe Ile Asp Val Lys Leu Ser Asp Tyr Lys Gly Lys Tyr
 20 25 30

acc gtc ctc ttc tat cca ctg gat ttc acg ttt gtc tgt cct acg 145
 Thr Val Leu Phe Phe Tyr Pro Leu Asp Phe Thr Phe Val Cys Pro Thr
 35 40 45

gaa atc atc gcc ttt tcc gac cgt gtc gaa gaa ttc aaa aaa atc gat 193
 Glu Ile Ile Ala Phe Ser Asp Arg Val Glu Glu Phe Lys Lys Ile Asp
 50 55 60

gct gcg gtc ctc gct tgt tca amt gat tcc gtt ttc tct cat ctg gcg 241
 Ala Ala Val Leu Ala Cys Ser Xaa Asp Ser Val Phe Ser His Leu Ala
 65 70 75 80

tgg atc aat act cct cgc aag atg ggc ggc ctt ggt gac atg aac att 289
 Trp Ile Asn Thr Pro Arg Lys Met Gly Gly Leu Gly Asp Met Asn Ile
 85 90 95

ccc gtt ctt gct gac acc aac cac caa att gca aag gac tat ggt gta 337
 Pro Val Leu Ala Asp Thr Asn His Gln Ile Ala Lys Asp Tyr Gly Val
 100 105 110

ctg aaa gaa gac gaa gga atc gct tac aga ggt ctt ttc att att gac 385
 Leu Lys Glu Asp Glu Gly Ile Ala Tyr Arg Gly Leu Phe Ile Ile Asp
 115 120 125

cct aag gga att ctg cga cag atc act gtc aat gac ctt cct gtc ggt 433
 Pro Lys Gly Ile Leu Arg Gln Ile Thr Val Asn Asp Leu Pro Val Gly
 130 135 140

cgc tct gtg gat gag act ctc cgt ctg gtg cag gcc ttc caa tac gtt 481
 Arg Ser Val Asp Glu Thr Leu Arg Leu Val Gln Ala Phe Gln Tyr Val
 145 150 155 160

gac aag cat ggt gag gtg tgc cca gct ggt tgg act cct gga aaa gct 529
 Asp Lys His Gly Glu Val Cys Pro Ala Gly Trp Thr Pro Gly Lys Ala
 165 170 175

acc atc aag cca ggt gtc aag gac agc aag gag tac ttc agc aaa gca 577
 Thr Ile Lys Pro Gly Val Lys Asp Ser Lys Glu Tyr Phe Ser Lys Ala
 180 185 190

aac taa 583
 Asn

<210> 6
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 <213> Ostertagia ostertagi

<220>
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 <222> (72)..(72)
 <223> The 'Xaa' at location 72 stands for Asn, or Thr.

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Ala Phe Ile Gly Lys Pro Ala Pro Asp Phe Ala Thr Lys Ala Val Tyr
 1 5 10 15

Asn Gly Asp Phe Ile Asp Val Lys Leu Ser Asp Tyr Lys Gly Lys Tyr
 20 25 30

Thr Val Leu Phe Phe Tyr Pro Leu Asp Phe Thr Phe Val Cys Pro Thr
 35 40 45

Glu Ile Ile Ala Phe Ser Asp Arg Val Glu Glu Phe Lys Lys Ile Asp
 50 55 60

Ala Ala Val Leu Ala Cys Ser Xaa Asp Ser Val Phe Ser His Leu Ala
 65 70 75 80

Trp Ile Asn Thr Pro Arg Lys Met Gly Gly Leu Gly Asp Met Asn Ile
 85 90 95

Pro Val Leu Ala Asp Thr Asn His Gln Ile Ala Lys Asp Tyr Gly Val
 100 105 110

Leu Lys Glu Asp Glu Gly Ile Ala Tyr Arg Gly Leu Phe Ile Ile Asp
 115 120 125

Pro Lys Gly Ile Leu Arg Gln Ile Thr Val Asn Asp Leu Pro Val Gly
 130 135 140

Arg Ser Val Asp Glu Thr Leu Arg Leu Val Gln Ala Phe Gln Tyr Val
 145 150 155 160

Asp Lys His Gly Glu Val Cys Pro Ala Gly Trp Thr Pro Gly Lys Ala
165 170 175

Thr Ile Lys Pro Gly Val Lys Asp Ser Lys Glu Tyr Phe Ser Lys Ala
180 185 190

Asn

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<213> *Ostertagia ostertagi*

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cta act cct tng cat cca acg cgt tgg gag ctc tnn cta tng ngg gaa      48
Leu Thr Pro Xaa His Pro Thr Arg Trp Glu Leu Xaa Leu Xaa Xaa Glu
1           5           10           15

ttg cna tgt ggt ggc gac nac tcc tgg agc ccg tca gta tcg gcg gaa      96
Leu Xaa Cys Gly Gly Asp Xaa Ser Trp Ser Pro Ser Val Ser Ala Glu
20          25          30

ttc gcg gcc gcg tcg acc gtt ggt gtt gcc ctc gcg gtc cac caa aca      144
Phe Ala Ala Ala Ser Thr Val Gly Val Ala Leu Ala Val His Gln Thr
35          40          45

ctt gac ctg ctt cct ctg aag cca cgc aag gag tac gtc ttc cgc ttt      192
Leu Asp Leu Leu Pro Leu Lys Pro Arg Lys Glu Tyr Val Phe Arg Phe
50          55          60

gaa gga nat gtt cac tcc gga atc ccg ctc cca acc gac acc acc atc      240
Glu Gly Xaa Val His Ser Gly Ile Pro Leu Pro Thr Asp Thr Thr Ile
65          70          75          80

tct cgc ata cag gct atg gta cat gtc cag atc cct gac gac cac cac      288
Ser Arg Ile Gln Ala Met Val His Val Gln Ile Pro Asp Asp His His
85          90          95

gcc att ctc aag ctg aga gat gtt cgc ttt gct act gga gaa gac gaa      336
Ala Ile Leu Lys Leu Arg Asp Val Arg Phe Ala Thr Gly Glu Asp Glu
100         105         110

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cgc aga gaa ctc ttc aaa ccg atc gat gac ctg aaa atg cgc aca atc	384
Arg Arg Glu Leu Phe Lys Pro Ile Asp Asp Leu Lys Met Arg Thr Ile	
115 120 125	
tca agg gag cac ctc gat ctc ctt gag ttg cca gtc cgt ttt gtc tac	432
Ser Arg Glu His Leu Asp Leu Leu Glu Leu Pro Val Arg Phe Val Tyr	
130 135 140	
aag aac ggc atg att tcc gat gta atc ttt gtc gac aag gag gag acc	480
Lys Asn Gly Met Ile Ser Asp Val Ile Phe Val Asp Lys Glu Glu Thr	
145 150 155 160	
tgg tcc cgc cag cgt gaa gcc gat ctg tca tca aca tgc tcc act tta	528
Trp Ser Arg Gln Arg Glu Ala Asp Leu Ser Ser Thr Cys Ser Thr Leu	
165 170 175	
acc tcc aca aga tgg gac gaa ctg acn agc ttt aca atg gac agg tcc	576
Thr Ser Thr Arg Trp Asp Glu Leu Thr Ser Phe Thr Met Asp Arg Ser	
180 185 190	
aag gtg gac ccg tng aca aac gag tac ttt cac tgg tta ccc gaa ccg	624
Lys Val Asp Pro Xaa Thr Asn Glu Tyr Phe His Trp Leu Pro Glu Pro	
195 200 205	
aac cca ttc gaa ggg aaa ctt gtn aag gtt ggc tta cnc cgg ttn tta	672
Asn Pro Phe Glu Gly Lys Leu Val Lys Val Gly Leu Xaa Arg Xaa Leu	
210 215 220	
aag aaa aaa ngg acc ttt tgg	693
Lys Lys Lys Xaa Thr Phe Trp	
225 230	

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<210> 8
<211> 231
<212> PRT
<213> Ostertagia ostertagi

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<222> (4)..(4)
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<220>
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<222> (12)..(12)
<223> The 'Xaa' at location 12 stands for Tyr, Trp, Cys, Ser, Leu, or
      Phe.

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<222> (14)..(14)
<223> The 'Xaa' at location 14 stands for Trp, Ser, or Leu.

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<222> (15)..(15)
<223> The 'Xaa' at location 15 stands for Arg, Gly, or Trp.

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<220>
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<223> The 'Xaa' at location 18 stands for Gln, Arg, Pro, or Leu.

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<223> The 'Xaa' at location 23 stands for Asn, Asp, His, or Tyr.

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<223> The 'Xaa' at location 221 stands for His, Arg, Pro, or Leu.

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<223> The 'Xaa' at location 223 stands for Leu, or Phe.

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Leu Thr Pro Xaa His Pro Thr Arg Trp Glu Leu Xaa Leu Xaa Xaa Glu
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Leu Xaa Cys Gly Gly Asp Xaa Ser Trp Ser Pro Ser Val Ser Ala Glu
 20 25 30

Phe Ala Ala Ala Ser Thr Val Gly Val Ala Leu Ala Val His Gln Thr
 35 40 45

Leu Asp Leu Leu Pro Leu Lys Pro Arg Lys Glu Tyr Val Phe Arg Phe
 50 55 60

Glu Gly Xaa Val His Ser Gly Ile Pro Leu Pro Thr Asp Thr Thr Ile
 65 70 75 80

Ser Arg Ile Gln Ala Met Val His Val Gln Ile Pro Asp Asp His His
 85 90 95

Ala Ile Leu Lys Leu Arg Asp Val Arg Phe Ala Thr Gly Glu Asp Glu
 100 105 110

Arg Arg Glu Leu Phe Lys Pro Ile Asp Asp Leu Lys Met Arg Thr Ile
 115 120 125

Ser Arg Glu His Leu Asp Leu Leu Glu Leu Pro Val Arg Phe Val Tyr
 130 135 140

Lys Asn Gly Met Ile Ser Asp Val Ile Phe Val Asp Lys Glu Glu Thr
 145 150 155 160

Trp Ser Arg Gln Arg Glu Ala Asp Leu Ser Ser Thr Cys Ser Thr Leu
 165 170 175

Thr Ser Thr Arg Trp Asp Glu Leu Thr Ser Phe Thr Met Asp Arg Ser
 180 185 190

Lys Val Asp Pro Xaa Thr Asn Glu Tyr Phe His Trp Leu Pro Glu Pro
 195 200 205

Asn Pro Phe Glu Gly Lys Leu Val Lys Val Gly Leu Xaa Arg Xaa Leu
 210 215 220

Lys Lys Lys Xaa Thr Phe Trp
 225 230

<210> 9
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 1 5 10

ttc tcc tat gcc gaa gca ggc ttt tgt tgt ccg aat agt cta agc caa 97
 Phe Ser Tyr Ala Glu Ala Gly Phe Cys Cys Pro Asn Ser Leu Ser Gln
 15 20 25

agt gac agc gcg agg cag att ttc ctc gat ttt cac aat gat gtt cgt 145
 Ser Asp Ser Ala Arg Gln Ile Phe Leu Asp Phe His Asn Asp Val Arg
 30 35 40 45

cga aat ata gca ctt gga aat ggt ttg ata aac tgg aca gta aat gca	193
Arg Asn Ile Ala Leu Gly Asn Gly Leu Ile Asn Trp Thr Val Asn Ala	
50 55 60	
gac gcg gtc att ctt ggt cca gct cag aac atg tac aaa gtt gac tgg	241
Asp Ala Val Ile Leu Gly Pro Ala Gln Asn Met Tyr Lys Val Asp Trp	
65 70 75	
gat tgc aac ttg gaa gaa gta gca gca caa cag att gcg cca tgc aat	289
Asp Cys Asn Leu Glu Glu Val Ala Ala Gln Gln Ile Ala Pro Cys Asn	
80 85 90	
gat ccc cta ccg ata aat acc agc ctg gct caa aat atc gct aga tgg	337
Asp Pro Leu Pro Ile Asn Thr Ser Leu Ala Gln Asn Ile Ala Arg Trp	
95 100 105	
ctg tac ttc aaa gac agt gaa gaa gag aca gtt ctg caa caa gta tcg	385
Leu Tyr Phe Lys Asp Ser Glu Glu Thr Val Leu Gln Gln Val Ser	
110 115 120 125	
tgg tat tgg gtg agc gca tcg ctg gga ttt atg aaa ggc acg aaa ctt	433
Trp Tyr Trp Val Ser Ala Ser Leu Gly Phe Met Lys Gly Thr Lys Leu	
130 135 140	
gac caa ttt gct aac cag tgg gct gaa cct cta gca aac att gca aac	481
Asp Gln Phe Ala Asn Gln Trp Ala Glu Pro Leu Ala Asn Ile Ala Asn	
145 150 155	
tat aga aac cga aag gtt gga tgt gcc cat aag atc tgc ccc gct cag	529
Tyr Arg Asn Arg Lys Val Gly Cys Ala His Lys Ile Cys Pro Ala Gln	
160 165 170	
caa aac atg gta gta tcc tgc gtg tat gga agc ccc aaa ctt gca ccg	577
Gln Asn Met Val Val Ser Cys Val Tyr Gly Ser Pro Lys Leu Ala Pro	
175 180 185	
aac gaa gtt atc tgg cag gaa gga aag gct tgt gtc gac gct cgt	625
Asn Glu Val Ile Trp Gln Glu Gly Lys Ala Cys Val Cys Asp Ala Arg	
190 195 200 205	
cca gat tca ttc tgc tgc gac aac ctg tgt gac acg cga gat gct gcg	673
Pro Asp Ser Phe Cys Cys Asp Asn Leu Cys Asp Thr Arg Asp Ala Ala	
210 215 220	
agt gtt cgc cac cag tgt tgc gcg tcg cca tga agcgaaaaga aattggtagt	726
Ser Val Arg His Gln Cys Cys Ala Ser Pro	
225 230	
cacccccaat aaaatattca tgcaaaaaaa aaaaaaaaa	763

<210> 10
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 <212> PRT
 <213> *Ostertagia ostertagi*

<400> 10

Met Ser Ala Ala Val Val Val Ala Val Leu Leu Ala Leu Phe Ser Tyr
 1 5 10 15

Ala Glu Ala Gly Phe Cys Cys Pro Asn Ser Leu Ser Gln Ser Asp Ser
20 25 30

Ala Arg Gln Ile Phe Leu Asp Phe His Asn Asp Val Arg Arg Asn Ile
35 40 45

Ala Leu Gly Asn Gly Leu Ile Asn Trp Thr Val Asn Ala Asp Ala Val
50 55 60

Ile Leu Gly Pro Ala Gln Asn Met Tyr Lys Val Asp Trp Asp Cys Asn
65 70 75 80

Leu Glu Glu Val Ala Ala Gln Gln Ile Ala Pro Cys Asn Asp Pro Leu
85 90 95

Pro Ile Asn Thr Ser Leu Ala Gln Asn Ile Ala Arg Trp Leu Tyr Phe
100 105 110

Lys Asp Ser Glu Glu Glu Thr Val Leu Gln Gln Val Ser Trp Tyr Trp
115 120 125

Val Ser Ala Ser Leu Gly Phe Met Lys Gly Thr Lys Leu Asp Gln Phe
130 135 140

Ala Asn Gln Trp Ala Glu Pro Leu Ala Asn Ile Ala Asn Tyr Arg Asn
145 150 155 160

Arg Lys Val Gly Cys Ala His Lys Ile Cys Pro Ala Gln Gln Asn Met
165 170 175

Val Val Ser Cys Val Tyr Gly Ser Pro Lys Leu Ala Pro Asn Glu Val
180 185 190

Ile Trp Gln Glu Gly Lys Ala Cys Val Cys Asp Ala Arg Pro Asp Ser
195 200 205

Phe Cys Cys Asp Asn Leu Cys Asp Thr Arg Asp Ala Ala Ser Val Arg
210 215 220

His Gln Cys Cys Ala Ser Pro
225 230

<210> 11
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 <213> *Ostertagia ostertagi*

<220>
 <221> CDS
 <222> (1)..(684)

<220>
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 <222> (813)..(813)
 <223> n is a, c, g, or t

<220>
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 Met Lys Leu Val Val Leu Cys Val Leu Cys Gly Ile Ala Leu Ala Ala
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ccg aga cag aaa cgc ctt act gtg ggc acg atc gct gtc acc gga gga 96
 Pro Arg Gln Lys Arg Leu Thr Val Gly Thr Ile Ala Val Thr Gly Gly
 20 25 30

gtc ggc gga tcc acg ggg tgt gta gtg act gga aat gtc ctc tac gca 144
 Val Gly Gly Ser Thr Gly Cys Val Val Thr Gly Asn Val Leu Tyr Ala
 35 40 45

aac ggt ttc cgc ctt cgt gaa ctc aac cca tcg gag cag caa gaa ctc 192
 Asn Gly Phe Arg Leu Arg Glu Leu Asn Pro Ser Glu Gln Gln Glu Leu
 50 55 60

gta aac tat gag aag cag gtg gcc gac tac aaa gcg gct gtg aag caa 240
 Val Asn Tyr Glu Lys Gln Val Ala Asp Tyr Lys Ala Ala Val Lys Gln
 65 70 75 80

gcc ctc aag gaa cgc cag gaa agc ctg aaa tcg cgc atg gct ggt aag 288
 Ala Leu Lys Glu Arg Gln Glu Ser Leu Lys Ser Arg Met Ala Gly Lys
 85 90 95

aag gag aag gct gtg act ccc aag gag gaa gat cta ccc aaa gct cca 336
 Lys Glu Lys Ala Val Thr Pro Lys Glu Glu Asp Leu Pro Lys Ala Pro
 100 105 110

cag aag ccc tca ttc tgc act gag gac gac acc acc cag ttc tac ttt 384
 Gln Lys Pro Ser Phe Cys Thr Glu Asp Asp Thr Thr Gln Phe Tyr Phe
 115 120 125

gat gga tgc atg gtt cag ggc aac aag gtc tac gtt ggc aac aca ttc 432
 Asp Gly Cys Met Val Gln Gly Asn Lys Val Tyr Val Gly Asn Thr Phe
 130 135 140

gcg cgc gat ttg gac cag aac gag att caa gag ctg aag gag ttt gag 480
 Ala Arg Asp Leu Asp Gln Asn Glu Ile Gln Glu Leu Lys Glu Phe Glu
 145 150 155 160

aag aag cag act gtc tac cag gaa tac gtc cag aag cag att caa gcg	528	
Lys Lys Gln Thr Val Tyr Gln Glu Tyr Val Gln Lys Gln Ile Gln Ala		
165 170 175		
caa gtg agc aat ctg ttc ggc ggt gcc gac ttc ttt tca tcg ttc ttc	576	
Gln Val Ser Asn Leu Phe Gly Gly Ala Asp Phe Phe Ser Ser Phe Phe		
180 185 190		
aac ggc gga tct gag aaa ggc tct tca acc acc act gtg gcc cca gtg	624	
Asn Gly Gly Ser Glu Lys Gly Ser Ser Thr Thr Val Ala Pro Val		
195 200 205		
ctt cct gaa gat gca cca gaa caa cca gct ggg ccc aac ttt tgc aca	672	
Leu Pro Glu Asp Ala Pro Glu Gln Pro Ala Gly Pro Asn Phe Cys Thr		
210 215 220		
agg atc tat tga tgggtattt ttatgatgac aaagtattta aataaatgca	724	
Arg Ile Tyr		
225		
gtagttgcct gttgctgtga attccacagc actcctactc acgggtgtcga ctgggtgattt	784	
agtcaacttta tttgcaatat ttttatgng ttaccgcaat tcgttgtata tttgtgttat	844	
aaacattaac atcnaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa	893	
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1 5 10 15		
Pro Arg Gln Lys Arg Leu Thr Val Gly Thr Ile Ala Val Thr Gly Gly		
20 25 30		
Val Gly Gly Ser Thr Gly Cys Val Val Thr Gly Asn Val Leu Tyr Ala		
35 40 45		
Asn Gly Phe Arg Leu Arg Glu Leu Asn Pro Ser Glu Gln Gln Glu Leu		
50 55 60		
Val Asn Tyr Glu Lys Gln Val Ala Asp Tyr Lys Ala Ala Val Lys Gln		
65 70 75 80		
Ala Leu Lys Glu Arg Gln Glu Ser Leu Lys Ser Arg Met Ala Gly Lys		
85 90 95		

Lys Glu Lys Ala Val Thr Pro Lys Glu Glu Asp Leu Pro Lys Ala Pro
 100 105 110

Gln Lys Pro Ser Phe Cys Thr Glu Asp Asp Thr Thr Gln Phe Tyr Phe
 115 120 125

Asp Gly Cys Met Val Gln Gly Asn Lys Val Tyr Val Gly Asn Thr Phe
 130 135 140

Ala Arg Asp Leu Asp Gln Asn Glu Ile Gln Glu Leu Lys Glu Phe Glu
 145 150 155 160

Lys Lys Gln Thr Val Tyr Gln Glu Tyr Val Gln Lys Gln Ile Gln Ala
 165 170 175

Gln Val Ser Asn Leu Phe Gly Gly Ala Asp Phe Phe Ser Ser Phe Phe
 180 185 190

Asn Gly Gly Ser Glu Lys Gly Ser Ser Thr Thr Thr Val Ala Pro Val
 195 200 205

Leu Pro Glu Asp Ala Pro Glu Gln Pro Ala Gly Pro Asn Phe Cys Thr
 210 215 220

Arg Ile Tyr
 225

<210> 13
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 <212> DNA
 <213> *Ostertagia ostertagi*

<220>
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 <222> (1)..(1725)

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 Met Arg Leu Ile Leu Ile Leu Leu Leu Val Val Ala Thr Asn Gly
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ggc ata att gac aaa ctg aaa gga ttg ttc act gga gaa ggc ggc ttt 96
 Gly Ile Ile Asp Lys Leu Lys Gly Leu Phe Thr Gly Glu Gly Gly Phe
 20 25 30

gga caa aaa gtg aag aat gca act gct gtt ggc ttc aaa aag ctc ttc 144
 Gly Gln Lys Val Lys Asn Ala Thr Ala Val Gly Phe Lys Lys Leu Phe
 35 40 45

gaa aac acg gca ctc ttc aga atc aat gat aag atc agg agc atg aag	192
Glu Asn Thr Ala Leu Phe Arg Ile Asn Asp Lys Ile Arg Ser Met Lys	
50 55 60	
gaa aaa gtg ttg aag acc ttg gaa cta tca cca gca atg atg aag tca	240
Glu Lys Val Leu Lys Thr Leu Glu Leu Ser Pro Ala Met Met Lys Ser	
65 70 75 80	
ctg caa kmg agg cta rwg aaw tsg cgr cck yct rma grw cga yma wrt	288
Leu Gln Xaa Arg Leu Xaa Xaa Arg Xaa Xaa Xaa Xaa Arg Xaa Xaa	
85 90 95	
rsr mga gmt sss aga crc gtw kka ygc rag gtc art aaa aat agt gag	336
Xaa Xaa Xaa Arg Xaa Xaa Xaa Xaa Val Xaa Lys Asn Ser Glu	
100 105 110	
gtt gac caa tac ctc tac caa ggc gac atg gtt tta aca gag gag caa	384
Val Asp Gln Tyr Leu Tyr Gln Gly Asp Met Val Leu Thr Glu Glu Gln	
115 120 125	
gcc gat gag atc gtt gag gac ata gaa gat cag gtc gcc ggt gga aat	432
Ala Asp Glu Ile Val Glu Asp Ile Glu Asp Gln Val Ala Gly Gly Asn	
130 135 140	
cgt aca aaa cgt caa gca ttc aag gat cat aaa tat ccc aaa acg ttg	480
Arg Thr Lys Arg Gln Ala Phe Lys Asp His Lys Tyr Pro Lys Thr Leu	
145 150 155 160	
tgg tca caa gga gtc aac tac tac ttc cat gat atg gcc agt aag cag	528
Trp Ser Gln Gly Val Asn Tyr Tyr Phe His Asp Met Ala Ser Lys Gln	
165 170 175	
atg aaa agc gta ttc gta aaa gga gcg aaa tgg tgg gaa aag gac acg	576
Met Lys Ser Val Phe Val Lys Gly Ala Lys Trp Trp Glu Lys Asp Thr	
180 185 190	
tgt atc aat ttc acg gag aac cgt tct gcc gaa gac cga att atg gta	624
Cys Ile Asn Phe Thr Glu Asn Arg Ser Ala Glu Asp Arg Ile Met Val	
195 200 205	
ttc cca cag aaa gga tgt tgg tca aat ata gga aaa atc ggt ggc gaa	672
Phe Pro Gln Lys Gly Cys Trp Ser Asn Ile Gly Lys Ile Gly Gly Glu	
210 215 220	
caa aag att tcg ttg gga gga ggt tgt cat tcg gta tcc att gct gcg	720
Gln Lys Ile Ser Leu Gly Gly Cys His Ser Val Ser Ile Ala Ala	
225 230 235 240	
cat gag atc ggt cac gca att gga ttc ttc cat act atg tcc cgt cac	768
His Glu Ile Gly His Ala Ile Gly Phe Phe His Thr Met Ser Arg His	
245 250 255	
gat cgc gat gaa ttc atc acc gta aac atg cac aat gtt gat gta cac	816
Asp Arg Asp Glu Phe Ile Thr Val Asn Met His Asn Val Asp Val His	
260 265 270	
tgg ctg agt caa ttt aat aaa gaa acg acg aag aga aat gat aat tat	864
Trp Leu Ser Gln Phe Asn Lys Glu Thr Thr Lys Arg Asn Asp Asn Tyr	
275 280 285	

gga atg acg tac gac tac ggt agc att atg cat tac ggt gga acc agt	912
Gly Met Thr Tyr Asp Tyr Gly Ser Ile Met His Tyr Gly Gly Thr Ser	
290 295 300	
gca tcg tac aat aat aag cca aca atg gtg ccg ttt gat gtg gac tat	960
Ala Ser Tyr Asn Asn Lys Pro Thr Met Val Pro Phe Asp Val Asp Tyr	
305 310 315 320	
cag caa acc ctt ggc tct cca ttc att tct ttc att gaa ctt tcc atg	1008
Gln Gln Thr Leu Gly Ser Pro Phe Ile Ser Phe Ile Glu Leu Ser Met	
325 330 335	
att aat gaa cac tac aaa tgc aaa gag aac tgc aat cca gct aag tcg	1056
Ile Asn Glu His Tyr Lys Cys Lys Glu Asn Cys Asn Pro Ala Lys Ser	
340 345 350	
gct aaa tgc gaa atg ggc gga ttc cct cat ccc cga gac tgc agc aaa	1104
Ala Lys Cys Glu Met Gly Gly Phe Pro His Pro Arg Asp Cys Ser Lys	
355 360 365	
tgt atc tgt cct ggt gga tac gcc gga gct cga tgc acc gaa aga cca	1152
Cys Ile Cys Pro Gly Gly Tyr Ala Gly Ala Arg Cys Thr Glu Arg Pro	
370 375 380	
tca ggg tgt ggc agt gca att caa gct tcg tcc gat tgg aag acc tta	1200
Ser Gly Cys Gly Ser Ala Ile Gln Ala Ser Ser Asp Trp Lys Thr Leu	
385 390 395 400	
caa gat acc ctt ggc aag gat gat gat gaa gaa cga gag gac ttc gag	1248
Gln Asp Thr Leu Gly Lys Asp Asp Asp Glu Glu Arg Glu Asp Phe Glu	
405 410 415	
aca tgt aat tac tgg att gaa tct cct gcc gga acm gaa atc gaa gtg	1296
Thr Cys Asn Tyr Trp Ile Glu Ser Pro Ala Gly Xaa Glu Ile Glu Val	
420 425 430	
agg tta ttg gat ttc acg agg ggt gtt tct gtc gat gga tgc aaa ttt	1344
Arg Leu Leu Asp Phe Thr Arg Gly Val Ser Val Asp Gly Cys Lys Phe	
435 440 445	
gcc ggt gta gag atc aag acc aat aag gat caa aca ctc act ggc tac	1392
Ala Gly Val Glu Ile Lys Thr Asn Lys Asp Gln Thr Leu Thr Gly Tyr	
450 455 460	
agg ttc tgc aca gct ggc gca gct ggc ata gca ctt cgt tct tac acg	1440
Arg Phe Cys Thr Ala Gly Ala Ala Gly Ile Ala Leu Arg Ser Tyr Thr	
465 470 475 480	
aat cgc gtc cca ata atg aca tac aac aga ttt ggt caa tcg acg act	1488
Asn Arg Val Pro Ile Met Thr Tyr Asn Arg Phe Gly Gln Ser Thr Thr	
485 490 495	
gtt ctc gaa tac cga cac gtt ccg gcg agt gcg cca aga acg ccc tca	1536
Val Leu Glu Tyr Arg His Val Pro Ala Ser Ala Pro Arg Thr Pro Ser	
500 505 510	
cct cca tct gct aca act cgt gct tct att act act act act act acg	1584
Pro Pro Ser Ala Thr Thr Arg Ala Ser Ile Thr Thr Thr Thr Thr	
515 520 525	

aag aaa ccc agc tct act gct gcc ttt aaa tgc gag gac aac cac act	1632
Lys Lys Pro Ser Ser Thr Ala Ala Phe Lys Cys Glu Asp Asn His Thr	
530 535 540	
tgt ccc tca ctt gta gcg agc ggt ttc tgc aaa ggg cca ctc tca gag	1680
Cys Pro Ser Leu Val Ala Ser Gly Phe Cys Lys Gly Pro Leu Ser Glu	
545 550 555 560	
gct acc aag aag aaa gtg tgt cca aag tcg tgt gga ctc tgc tga	1725
Ala Thr Lys Lys Val Cys Pro Lys Ser Cys Gly Leu Cys	
565 570	
tacaacactt tctctgtaat aaaatctgaa caattc	1761
<210> 14	
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<213> <i>Ostertagia ostertagi</i>	
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<222> (83)..(83)	
<223> The 'Xaa' at location 83 stands for Glu, Ala, or Ser.	
<220>	
<221> misc_feature	
<222> (86)..(86)	
<223> The 'Xaa' at location 86 stands for Glu, Val, Lys, or Met.	
<220>	
<221> misc_feature	
<222> (87)..(87)	
<223> The 'Xaa' at location 87 stands for Lys, or Asn.	
<220>	
<221> misc_feature	
<222> (88)..(88)	
<223> The 'Xaa' at location 88 stands for Trp, or Ser.	
<220>	
<221> misc_feature	
<222> (90)..(90)	
<223> The 'Xaa' at location 90 stands for Pro.	
<220>	
<221> misc_feature	
<222> (91)..(91)	
<223> The 'Xaa' at location 91 stands for Pro, or Ser.	
<220>	
<221> misc_feature	
<222> (92)..(92)	
<223> The 'Xaa' at location 92 stands for Glu, Ala, Lys, or Thr.	
<220>	
<221> misc_feature	
<222> (93)..(93)	
<223> The 'Xaa' at location 93 stands for Gly, Glu, or Asp.	

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<220>
<221> misc_feature
<222> (95)..(95)
<223> The 'Xaa' at location 95 stands for Gln, Pro, or Ser.

<220>
<221> misc_feature
<222> (96)..(96)
<223> The 'Xaa' at location 96 stands for Ser, Asn, Cys, or Tyr.

<220>
<221> misc_feature
<222> (97)..(97)
<223> The 'Xaa' at location 97 stands for Gly, Ala, Arg, or Thr.

<220>
<221> misc_feature
<222> (98)..(98)
<223> The 'Xaa' at location 98 stands for Arg.

<220>
<221> misc_feature
<222> (99)..(99)
<223> The 'Xaa' at location 99 stands for Asp, or Ala.

<220>
<221> misc_feature
<222> (100)..(100)
<223> The 'Xaa' at location 100 stands for Gly, Ala, Arg, or Pro.

<220>
<221> misc_feature
<222> (102)..(102)
<223> The 'Xaa' at location 102 stands for Arg, or His.

<220>
<221> misc_feature
<222> (103)..(103)
<223> The 'Xaa' at location 103 stands for Val.

<220>
<221> misc_feature
<222> (104)..(104)
<223> The 'Xaa' at location 104 stands for Gly, Val, or Leu.

<220>
<221> misc_feature
<222> (105)..(105)
<223> The 'Xaa' at location 105 stands for Arg, or Cys.

<220>
<221> misc_feature
<222> (106)..(106)
<223> The 'Xaa' at location 106 stands for Glu, or Lys.

<220>
<221> misc_feature
<222> (108)..(108)
<223> The 'Xaa' at location 108 stands for Ser, or Asn.
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<220>
 <221> misc_feature
 <222> (428)..(428)
 <223> The 'Xaa' at location 428 stands for Thr.

<400> 14

Met Arg Leu Ile Leu Leu Ile Leu Leu Leu Val Val Ala Thr Asn Gly
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Gly Ile Ile Asp Lys Leu Lys Gly Leu Phe Thr Gly Glu Gly Gly Phe
 20 25 30

Gly Gln Lys Val Lys Asn Ala Thr Ala Val Gly Phe Lys Lys Leu Phe
 35 40 45

Glu Asn Thr Ala Leu Phe Arg Ile Asn Asp Lys Ile Arg Ser Met Lys
 50 55 60

Glu Lys Val Leu Lys Thr Leu Glu Leu Ser Pro Ala Met Met Lys Ser
 65 70 75 80

Leu Gln Xaa Arg Leu Xaa Xaa Xaa Arg Xaa Xaa Xaa Xaa Arg Xaa Xaa
 85 90 95

Xaa Xaa Xaa Xaa Arg Xaa Xaa Xaa Xaa Val Xaa Lys Asn Ser Glu
 100 105 110

Val Asp Gln Tyr Leu Tyr Gln Gly Asp Met Val Leu Thr Glu Glu Gln
 115 120 125

Ala Asp Glu Ile Val Glu Asp Ile Glu Asp Gln Val Ala Gly Gly Asn
 130 135 140

Arg Thr Lys Arg Gln Ala Phe Lys Asp His Lys Tyr Pro Lys Thr Leu
 145 150 155 160

Trp Ser Gln Gly Val Asn Tyr Tyr Phe His Asp Met Ala Ser Lys Gln
 165 170 175

Met Lys Ser Val Phe Val Lys Gly Ala Lys Trp Trp Glu Lys Asp Thr
 180 185 190

Cys Ile Asn Phe Thr Glu Asn Arg Ser Ala Glu Asp Arg Ile Met Val
 195 200 205

Phe Pro Gln Lys Gly Cys Trp Ser Asn Ile Gly Lys Ile Gly Gly Glu
 210 215 220

Gln Lys Ile Ser Leu Gly Gly Gly Cys His Ser Val Ser Ile Ala Ala
 225 230 235 240

His Glu Ile Gly His Ala Ile Gly Phe Phe His Thr Met Ser Arg His
 245 250 255

Asp Arg Asp Glu Phe Ile Thr Val Asn Met His Asn Val Asp Val His
 260 265 270

Trp Leu Ser Gln Phe Asn Lys Glu Thr Thr Lys Arg Asn Asp Asn Tyr
 275 280 285

Gly Met Thr Tyr Asp Tyr Gly Ser Ile Met His Tyr Gly Gly Thr Ser
 290 295 300

Ala Ser Tyr Asn Asn Lys Pro Thr Met Val Pro Phe Asp Val Asp Tyr
 305 310 315 320

Gln Gln Thr Leu Gly Ser Pro Phe Ile Ser Phe Ile Glu Leu Ser Met
 325 330 335

Ile Asn Glu His Tyr Lys Cys Lys Glu Asn Cys Asn Pro Ala Lys Ser
 340 345 350

Ala Lys Cys Glu Met Gly Gly Phe Pro His Pro Arg Asp Cys Ser Lys
 355 360 365

Cys Ile Cys Pro Gly Gly Tyr Ala Gly Ala Arg Cys Thr Glu Arg Pro
 370 375 380

Ser Gly Cys Gly Ser Ala Ile Gln Ala Ser Ser Asp Trp Lys Thr Leu
 385 390 395 400

Gln Asp Thr Leu Gly Lys Asp Asp Asp Glu Glu Arg Glu Asp Phe Glu
 405 410 415

Thr Cys Asn Tyr Trp Ile Glu Ser Pro Ala Gly Xaa Glu Ile Glu Val
 420 425 430

Arg Leu Leu Asp Phe Thr Arg Gly Val Ser Val Asp Gly Cys Lys Phe
 435 440 445

Ala Gly Val Glu Ile Lys Thr Asn Lys Asp Gln Thr Leu Thr Gly Tyr
 450 455 460

Arg Phe Cys Thr Ala Gly Ala Ala Gly Ile Ala Leu Arg Ser Tyr Thr
 465 470 475 480

Asn Arg Val Pro Ile Met Thr Tyr Asn Arg Phe Gly Gln Ser Thr Thr
 485 490 495

Val Leu Glu Tyr Arg His Val Pro Ala Ser Ala Pro Arg Thr Pro Ser
 500 505 510

Pro Pro Ser Ala Thr Thr Arg Ala Ser Ile Thr Thr Thr Thr Thr
 515 520 525

Lys Lys Pro Ser Ser Thr Ala Ala Phe Lys Cys Glu Asp Asn His Thr
 530 535 540

Cys Pro Ser Leu Val Ala Ser Gly Phe Cys Lys Gly Pro Leu Ser Glu
 545 550 555 560

Ala Thr Lys Lys Lys Val Cys Pro Lys Ser Cys Gly Leu Cys
 565 570

<210> 15
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 <213> Artificial

<220>
 <223> primer: Lambdagt11F

<220>
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 <223> Lambdagt11F

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 ggtggcgacg actcctggag cccg

24

<210> 16
 <211> 24
 <212> DNA
 <213> Artificial

<220>
 <223> primer: Lambdagt11R

<400> 16
 ttgacaccag accaactggc aatg

24

<210> 17
<211> 20
<212> DNA
<213> Artificial

<220>
<223> primer: SP6

<400> 17
atttaggtga cactatagaa 20

<210> 18
<211> 22
<212> DNA
<213> Artificial

<220>
<223> primer: T7

<400> 18
gtaatacgac tcactatagg gc 22

<210> 19
<211> 21
<212> DNA
<213> Artificial

<220>
<223> primer: 24kForw

<400> 19
gaattcatga agttggtcgt g 21

<210> 20
<211> 22
<212> DNA
<213> Artificial

<220>
<223> primer: 24kRev

<400> 20
ctcgagtcaa tagatccttg tg 22

<210> 21
<211> 36
<212> DNA
<213> Artificial

<220>
<223> primer: AAP

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<222> (24)..(25)
<223> n = Inosine

<220>
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<222> (29)..(30)
<223> n = Inosine

<220>
<221> misc_feature
<222> (34)..(35)
<223> n = Inosine

<400> 21
ggccacgcgt cgactagtagc gggnnnnnnn gggnnng 36

<210> 22
<211> 32
<212> DNA
<213> Artificial

<220>
<223> primer: UAP

<400> 22
cuacuacuac uaggccacgc gtcgactagt ac 32

<210> 23
<211> 21
<212> DNA
<213> Artificial

<220>
<223> primer: 65Rev1

<400> 23
cagcaatgga taccgaatga c 21

<210> 24
<211> 22
<212> DNA
<213> Artificial

<220>
<223> primer: 65Rev2

<400> 24
agtgacttca tcattgctgg tg 22

<210> 25
<211> 21
<212> DNA
<213> Artificial

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<220>
<223> primer: 65kForw

<400> 25
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21

<210> 26
<211> 30
<212> DNA
<213> Artificial

<220>
<223> primer: For65

<400> 26
ggatccatga ggctgatatt gctcattta

30

<210> 27
<211> 27
<212> DNA
<213> Artificial

<220>
<223> primer: Rev65

<400> 27
ctcgaggcag agtccacacg actttgg

27